

ARCHITECTURAL
P O R C E L A I N E N A M E L
T O N C A N I R O N
ENAMELING STOCK
R E P U B L I C S T E E L C O R P O R A T I O N

An Ancient Art THE BASIS OF

A Modern Building Material



Ancient Art
Cloisonné Vase

COURTESY METROPOLITAN MUSEUM
OF ART

BEFORE the dawn of Christianity, ancient artisans found that minerals could be melted together and fused to a metal base. During the next thousand years or so, porcelain enamel was used in the creation of beautiful cloisonné vases, medallions and ornaments of various kinds. The application of porcelain enamel to cooking utensils, plumbing ware, stoves, refrigerators and other household products came as the next logical forward step.

Porcelain enamel first made its appearance in the architectural field in gasoline service stations and hamburger stands because of its cleanliness, low maintenance costs and high salvage value.

Today, architectural porcelain enamel is far more than a "novelty" material. New finishes, including soft matte finishes, new methods of fabrication allowing greater freedom in design, new methods of erection and concealed fastenings, all have combined to make architectural porcelain enamel an accepted high quality building material—one that can be classified as truly modern.

The application of porcelain enamel is steadily expanding into new fields. There are now companies all over the country that specialize in the fabrication and enameling of iron sheets for architectural purposes. Store fronts, theatre fronts and lobbies, gas stations, dairies, even entire building exteriors of porcelain enamel are almost as familiar as the porcelain enameled kitchen stove and refrigerator.

A New Freedom IN ARCHITECTURAL DESIGN

Have you ever wished for a material that would permit full expression of design and color and at the same time provide practicability at moderate costs? Porcelain enamel is one of the most versatile materials ever developed for architectural purposes. No material offers such a challenge to the creative initiative of the architect. It offers a complete range of lasting, permanent colors, embodying delicate tints and shades—in fact no color limitation. Being a vitreous material it is non-porous and non-absorbent and is as easily

cleaned as a china dish. It can be supplied in acid-resisting finishes for service in sulphur-laden atmospheres. It has unusual resistance to abrasion not found in plastics or organic coatings. It has almost unlimited possibilities of surface design, and types of finishes. It can be obtained in welded, stamped or drawn shapes. When using a panel system it is lighter in weight than most masonry products and can be quickly taken down, moved and reassembled practically without loss.

Where Architectural Porcelain Enamel IS BEING USED . . .

Porcelain Enamel has literally taken the architectural field by storm. The uses listed below will serve to show the wide range of possible applications and stimulate the architectural mind along creative lines. For lasting beauty, for attention value unhampered by design limitations . . . specify Porcelain Enamel.

Gasoline Service Stations: Exterior and interior paneling: Signs.

Food Stands: Exterior and interior paneling: Signs.

Bus Stations: Exterior and interior paneling: Signs.

Store Fronts: Paneling: Signs: Lighting Equipment.

Food Industries, such as Packing Houses, Dairies, Breweries, Bakeries, Canning Plants: Interior paneling, walls and ceiling—for sanitation; Exterior paneling—for low upkeep and publicity value.

Office Buildings: Wainscoting, Column Sheathing.

Hospital Operating Rooms: Doors, ceiling and wall paneling.

Hotel and Restaurant Wash Rooms: Walls, ceilings, doors, toilet stalls.

Theatre Fronts and Lobbies.

Dental and Medical Offices.

Kitchen and Bathroom Walls and Ceilings.

Laundries: Interior wall and ceiling paneling and doors—to resist steam and alkalis.

Chemical Laboratories: Walls, doors, ceilings, hoods and shelving—to resist corrosive chemical fumes—to increase light reflection.

Barber Shops and Beauty Parlors: Interiors.

Elevator Cabs and Lobbies.

Miscellaneous Uses: Shower bath stalls, toilet stalls, partitions for beauty parlors, hospitals, etc., shelving, restaurant table tops, formed steel plumbing fixtures, refrigerator display cases, counters, fruit and vegetable stands, kitchen cabinets, light reflectors, bar equipment, soda fountains, blackboards, kick plates, push plates, fireplaces, telephone booths, desk tops, spandrels of office buildings, prefabricated splashers panels for plumbing fixtures.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES

CLEVELAND, OHIO

What is ARCHITECTURAL PORCELAIN ENAMEL?

Porcelain enamel is an inorganic material. It is composed of several minerals including feldspar, cryolite and fluorspar fused together at high temperature and then shattered into "frits" by sudden immersion in cold water. These "frits" are then ground into powder and fused again upon a ferrous metal base. Because it is inorganic, it does not fade and is im-

pervious to moisture, being non-absorbent. This tough, glass-like coating is not affected by weather or light. Recent developments have led to the production of acid-resisting porcelain enamel which repels the attack of ordinary acids frequently encountered in building service or in the atmosphere.

These pages offer the Architect . . .

INTERESTING DATA ON MODERN PORCELAIN ENAMEL

We have endeavored to acquaint the architect with some of the more common uses and application methods of porcelain enamel in present day architectural design. We have presented several systems of construction so that he may compare one with the other and select that best suited to his requirements. For additional data on any specific problem write direct to Cleveland or to any Republic District Sales Office (see list on back cover).

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THE IMPORTANCE OF TONCAN IRON ENAMELING SHEETS

To meet the requirements of modern architectural applications of porcelain enamel requires a high grade sheet. The physical properties of the sheet are, of course, of an importance equal to its ability to accept a satisfactory coating of porcelain enamel. The widespread use of enameled products prior to their application in the architectural field has involved some of the most difficult fabrication operations which are encountered anywhere in the use of sheet metal.

Experience of many years has demonstrated that open hearth irons are most suitable for porcelain enameling. Toncan Iron is one of the oldest open hearth irons in the market, having been produced for thirty years. The high ductility of Toncan Iron lends itself to exceedingly difficult forming operations which are becoming increasingly popular with the widespread use of Porcelain Enamel in architectural design.

Toncan Iron Enameling Sheets, therefore, combine the physical properties required for difficult fabrication and the ability to accept a high grade coat of porcelain enamel.

Before and after enameling, Toncan Iron Enameling Sheets are unusually flat, free from waves and buckles and, in addition, have the highly desirable properties of an open hearth iron for enamel adherence and for freedom from segregated impurities which might react with the porcelain enamel during firing.

Constant research is conducted by Republic in an effort to keep Toncan Iron at all times suitable for all types of porcelain enamel. Close cooperation with the manufacturers of frits, as well as with those plants which produce their own frit, enables us to work out with the enameler any problem in connection with the use of our product.

Republic's METALLURGICAL and ARCHITECTURAL SERVICE

Republic Steel Corporation maintains a special engineering and research department devoted to the development of enameling iron. Another department in the Product Development Division is devoted to the study of the application of porcelain enameled iron. Republic engineers are ready to assist architects and designers in the selection of the proper type of porcelain enamel construction for any specific job. For further information regarding this service, write direct to the main office or any of our district offices.



Davidson Enamel Products, Inc., Lima, Ohio
Douglas Andrews, Architect

This modern building is entirely covered with porcelain enamel. Trim is stainless steel.

Design Material FOR BEAUTY



Base Metal—Enamellers, referring to base metal, usually mean the sheet iron or cast metal base to which enamel is applied.

Blackboard Enamel—A special type of black enamel designed to give a matte surface finish to blackboards.

Black Edging—A further coat of enamel applied to the fired or unfired ground coat around the edges of the article thus producing an edging blacker than the ground coat.

Blank—A term widely used in sheet metal working to denote the piece cut from the sheet that is to be used in forming the finished article. The blank ordinarily contains exactly the right amount of metal to form a piece of the desired size. The operation which consists of punching the blanks from the original sheet of metal is called blanking.

Burning—Referred to in the enamel industry as the process of fusing vitreous or porcelain enamel on a metal surface.

Cleaner—Usually a mixture of alkalis reinforced with other ingredients and used at a concentration of 6-8 oz. per gallon at a temperature of about 200-212 degrees F. in the pickle room to clean rust, grease and dirt from metal parts prior to enameling.

Color Oxide—A mixture of inorganic materials used in the mill addition to color porcelain enamels.

Cover Coat—A porcelain enamel coating applied over the ground coat and from which it usually differs in color.

Crazing—Almost invisible lines in a finished enameled surface, extending down to the base metal. This condition should not be confused with "Hair-lines."

Crimping—An operation wherein the metal around or along the edge of the piece is shaped into the form of a roll or curl.

Decalcomanias or Decals—Are designs printed on tissue paper in refractory enamel colors rather than in ordinary printer's ink. These designs may be transferred to a burned enamel surface and fired thereon becoming an integral part of the coating.

Drawing—Drawing proper consists in cupping a blank (that is, taking a sheet metal blank and producing a cuplike shape) during which process a flowing of the metal takes place.

Edging—The process of removing dried cover coat from the edge of a piece of ware to expose an underlying enamel. Edging may also denote the application of colored enamel to the edge after brushing.

Egg-Shell Finish—An enameled surface similar in appearance to the shell of an egg. A desired physical condition in some ground coats.

Flecked—A variation in the solid color secured on enameled ware by mixing into an enamel, sized particles of frit of a different color.

Frit—Small, friable pieces of enamel glass resulting from the quenching and shattering of the molten enamel as it is discharged from the smelter into tanks containing cold water.

Fusion—The union or blending of enameling ingredients with the base metal or previously fired enamel coating to produce a uniform surface using heat as the medium.

Graining—The production of an enamel finish resembling wood grain. Similar to the printing of small etchings except that the ink is picked up from the etched plate on a special roller and transferred to the enamel surface to be grained.

Ground Coat—A coat of enamel applied directly to the metal surface and differing in composition from the cover coats to be applied later.

Hair-Lines—Hair-Lines are lines appearing in an enameled surface, which are slightly depressed below the surface in the shape of a groove and not extending to the base metal. In white enamel the lines appear white, but in colored or dark enamels, the lines nearly always appear darker than the surrounding surface.

Marble-ized—An enameled surface color-grained to give the appearance of variegated marble. The color may be applied on either the fired or unfired enamel ware.

Matte—A slightly roughened surface almost, or entirely lacking in lustre.

Opacity—The degree of whiteness of a white enamel, calculated by its ability to cover black or blue-black ground coats.

Pickling—The practice of cleaning sheet metal to properly prepare it to receive the enamel coatings.

Printing—Printing on the enamel is done with a rubber or composition stamp having raised letters or design. The ink for this work is composed of a suitable mixture of oils as a vehicle and a ceramic printing oxide.

Semi-Matte Finish—An enameled surface not altogether rough to the touch but having a slight glossy appearance may be known as a semi-matte finish.

Shading—A pleasing effect produced in enamel by applying, usually by spraying, an area of dark enamel to a lighter background, the thickness being tapered off in one or more directions.

Speckled Ware—An enamel finish having a background of uniform color into which an enamel of different color or shade is applied in very small specks.

Stain-Proof—An enameled surface is considered "stain-proof" if it is not stained, discolored or otherwise affected by acids (except Hydrofluoric), chemicals, dyes or fruit juices, under atmospheric conditions.

Stencil—A design which may be cut from either cardboard or sheet zinc and placed on the dry enamel coating. A stencil brush is used to remove the dry enamel from the stencil openings.

*Reproduced by permission of the Ferro Enamel Corporation.

Fabricating THE PANELS

Sheets for porcelain enameling work usually are fabricated in the enameling shop. Drawings with accurate dimensions are necessary since all panels are prefabricated and must fit together on the job. As a general rule, No. 16 or 18 gauge sheets of enameling iron are used, but No. 20 gauge may be employed if the finished panel is carefully backed up or veneered. Unless exceedingly careful backing up is done the 20 gauge sheets will buckle. It is advisable to keep the size of the sheets down to 36 in. wide by 48 in. long to minimize distortion.

Before enameling the sheets are sheared, bent, drawn and punched in the usual manner. These sheets may also be fab-

ricated into special shapes such as flutings, reedings, louvers, etc. Usually the holes in the panel are of predetermined size and location and are punched or cut in the panels before enameling. However, in emergencies the holes can be sawed through the finished porcelain enameled panel on the job by means of a portable, electric ceramic hole saw. Sawing should be avoided when possible.

As a general rule, all connections are welded, including flanges, clips, corners, etc. These are then filed smooth before all dirt and grease is removed from the sheets. The sheets are then pickled in acid to remove rust and scale.

Enameling THE PANELS

Following the pickling process, which prepares the surface of the panels for bonding with the porcelain enamel, they are given a dark colored base or ground coat. This ground coat is applied either by dip or spray process. This coat is so compounded that it has an affinity for and fuses with the metal itself. Successive coats are usually sprayed on. Each coat is fused in a furnace at 1500 to 1550 deg. F. A standard enameling furnace accommodates panels up to about 4x10 ft., thus limiting the size of panels that can be safely fired. Following the applications of the

porcelain enamel, all sheets are carefully inspected for imperfections.

For all exterior work, acid-resisting enamels should be specified. Porcelain enamel is available in glaze, semi-matte and matte finishes; the latter two having fewer high lights and reflections than in a glaze finish. Texture can be obtained by covering a glaze enamel with a semi-matte enamel of the same color and stencilling a design so that the glaze enamel shows through. Stippled effects and designs printed by screen process can also be obtained.

SUPPORTING STRUCTURES AND INSTALLATION OF PANELS

For remodeling work where the panel type of construction is used, the old structures are frequently leveled off with wood or metal furring strips located where the panel joints are to be. Care should be exercised to insure an accurate spacing of the furring strips and a level support for the panels.

On new buildings, if the supporting structure is to be masonry or wood studding, it is necessary that extra caution be taken to hold supporting structures to accurate dimensions and to keep the buildings plumb.

Steel frames are being used for small buildings such as gas stations, food stands, etc. These frames are often made of light gauge "U" channels welded into rectangular sections. These rectangular sections are bolted to the foundations and fastened together on

the job. These steel frames offer a dependable, accurate, supporting structure for the pre-fabricated porcelain enameled panels.

When interlocking panel systems are used, the starting points and the end points must be determined for the fastening of the panels to the supporting structure. In remodeling work where custom fitting is involved, each panel should be numbered on the drawing and this number marked on the back of the panels before shipping.

On certain types of construction, caulking can be simplified by "buttering" the flanges of the panels with a knife grade caulking compound. When the panels are fastened in place, excess caulking is squeezed out and trimmed off with a tuck-pointing tool.

Systems of Construction

There are two general types of construction employing porcelain enamel materials: the load-bearing type and the sheet or panel type. Both types are widely used and their use depends upon the conditions to be met, designs required, cost, etc.

On the following pages are shown details of several of the more commonly used systems of construction. These are not the only practical systems, however, but are typical of the meritorious devices which are constantly being developed.

In the load-bearing type, porcelain enamel sheets or fabricated forms are backed with light weight, load-bearing, concrete units. The panel edges may be trimmed with narrow stainless steel edging to protect these edges from corrosion or the panel may be flanged on all sides. In the sheet or panel type of construction, the porcelain enamel sheets are anchored to a supporting construction by various methods. Some of those in more common use are shown on the following pages.

The danger of warpage in porcelain enameled panels can be reduced greatly by using heavy gauge sheets of enameling iron and by keeping the panel sizes within certain dimensions. Fluted and heavily embossed panels usually have enough rigidity to prevent any noticeable warpage.

The normal warpage in porcelain enameled panels can be removed *after* the panels are enameled by backing up the panels with concrete, plywood, or insulating boards. This backing on the porcelain enameled panels has the additional advantages of removing metallic sound, reducing the transmission of sound, providing insulation against heat and cold, as well as preventing "sweating" on the back of the panels.

When backing up the panels with insulating board or plywood, the material is usually veneered to the panel under pressure, using water-proof casene glue or synthetic resins as adhesives. It is necessary as in the case in most veneered constructions to balance the veneering with another piece of steel on the back of the insulating board or plywood.

Republic Galvannealed Sheets of 26 or 28 gauge are a good material for this purpose. A galvannealed sheet is one which is hot dipped galvanized in the customary manner but which, before cooling, is heat treated. Thus, the protective zinc is made to combine with the steel sheet. The silver matte surface of the galvannealed sheet is a series of zinc-iron alloys bound to the sheet because it is an integral part of the sheet. The zinc coating prevents a chemical reaction from taking place between steel and adhesives. This galvannealed sheet is a better sheet for veneering than is a galvanized sheet because the matte surface of the galvannealed sheet assures a mechanical bond uniformly stronger than the smooth, greasy surface of the galvanized sheet.

Of the many types of caulking compounds that have been tested, those that contain slow drying oils such as tung oil or China wood oil and long Canadian asbestos fiber, seem to have the longest life, adhering to the porcelain enamel the best and remaining plastic the longest, thus taking care of the thermal expansion of the porcelain enameled panels.

For interior uses, especially between panels on working surfaces a self-vulcanizing rubber putty has been found to bring good results. One of these is made by a leading rubber company and is called "Plastikon Putty."

Modern Architectural Design EMPLOYS THE



Photos by F. S. Lincoln

Chase National Bank, Rockefeller Plaza, New York City

Reinhard and Hofmeister, Architects
Enameling by Ace Porcelain Steel Corp. (branch of
Lansdale (Pa.) Porcelain Enamel Corp.) New York City
*Porcelain enamel sheathing for columns gives this
bank interior a note of dignified smartness. This is said
to be the first time porcelain enamel has been used for
this type of application.*

Faurot Building Lima, Ohio

Douglas Andrews, Designer
Enameling by Davidson Enamel
Products, Inc., Lima, Ohio
*The background of this build-
ing is cream colored porcelain
enamel trimmed in brown.*



J. Austin Oil Co. Station Wayne, Michigan

Peter Brender, Designer and Engineer
Wayne, Michigan
Enameling by Wolverine Enameling Co., Detroit, Mich.
*Porcelain Enamel Tiles, cream field, black and red
trim. Letters in bright red.*



Perry Theater Pittsburgh, Pa.

Architect—John Ebersohn
New York City
Enameling by Porcelain Metals,
Inc., Long Island City, N. Y.



Weber Dairy Joliet, Illinois

Designed by B. & M. Sign Co., Joliet, Ill.
Enameling by Porcelain Products Co.,
Cicero, Ill.
*An unusual porcelain enamel installation
featuring combination of glass block and
light trough with block letters.*



Below: Detail of sign Girardville High School, Girardville, Pa. Notice louvres in the porcelain enamel. Architects—Grootenboer and Knobloch. Enameling by Enamel Products Company, Cleveland.



Above: Main Entrance Girardville High School. Blue Porcelain Enamel with Enduro Stainless Steel Trim.

Right: The Marlyn Apartments, Washington, D. C.

A very unusual application of Porcelain Enamel. Over 100 Spandrels (beneath the windows—finished in cream with two vertical stripes in maroon) were used in conjunction with yellow brick to make an attractive structure.

Enameling by The Toledo Porcelain Enamel Products Co., Toledo, Ohio

1. Stouffers Park-n-dine Washington, D. C.

Spandrels erected by Structural Porcelain Co., Washington, D. C.

Enameling by Toledo Porcelain Enamel Products Co., Toledo, Ohio

An interesting combination of brick and porcelain enamel.

2. Baker's Shoe Store Memphis, Tenn.

Emil W. Forman, Architect,
St. Louis, Mo.

Enameling by Davidson Enamel Products Co., Lima, Ohio

The background of this porcelain enamel installation is cream with trim and letters of bright red.

3. Union Pacific Ticket Office Denver, Colo.

T. H. Buell Company, Denver, Colo.,
Architects

R. C. Williams, Chicago, Ill.,
Associate Architects

Enameling by Porcelain Products Co.,
Cicero, Ill.



1

2

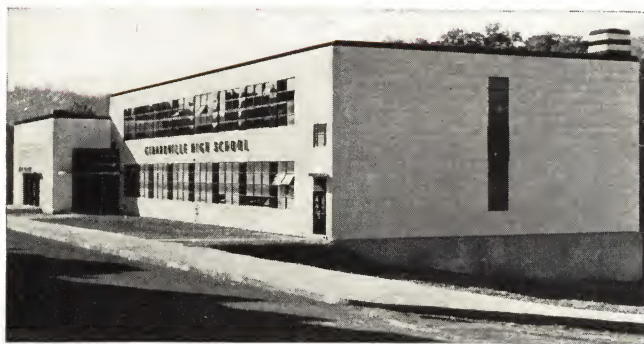
3



Design Material FOR FLEXIBILITY



Conclusive Proof OF THE ADAPTABILITY OF PORCELAIN ENAMEL



Girardville High School, Girardville, Pa.
Architects—Grootenboer and Knobloch
Enameling by Enamel Products Company, Cleveland



Why PORCELAIN ENAMEL WAS SPECIFIED IN THE GIRARDVILLE, PA. HIGH SCHOOL

Statement of D. H. Grootenboer and Philip G. Knobloch,
Archts., Pottsville, Pa.

"In this locality (Girardville, Pa.) we encounter a very unusual condition brought about by underground mining activities. Subsidence of the ground is experienced and at times a slipping or pull causes buildings to lean precariously and finally to collapse. In the Girardville, Pa., High School, a light steel frame covered with architectural porcelain enamel has solved this problem and obtained other benefits as well.

"Briefly, we find that architectural porcelain enamel construction has the following advantages:

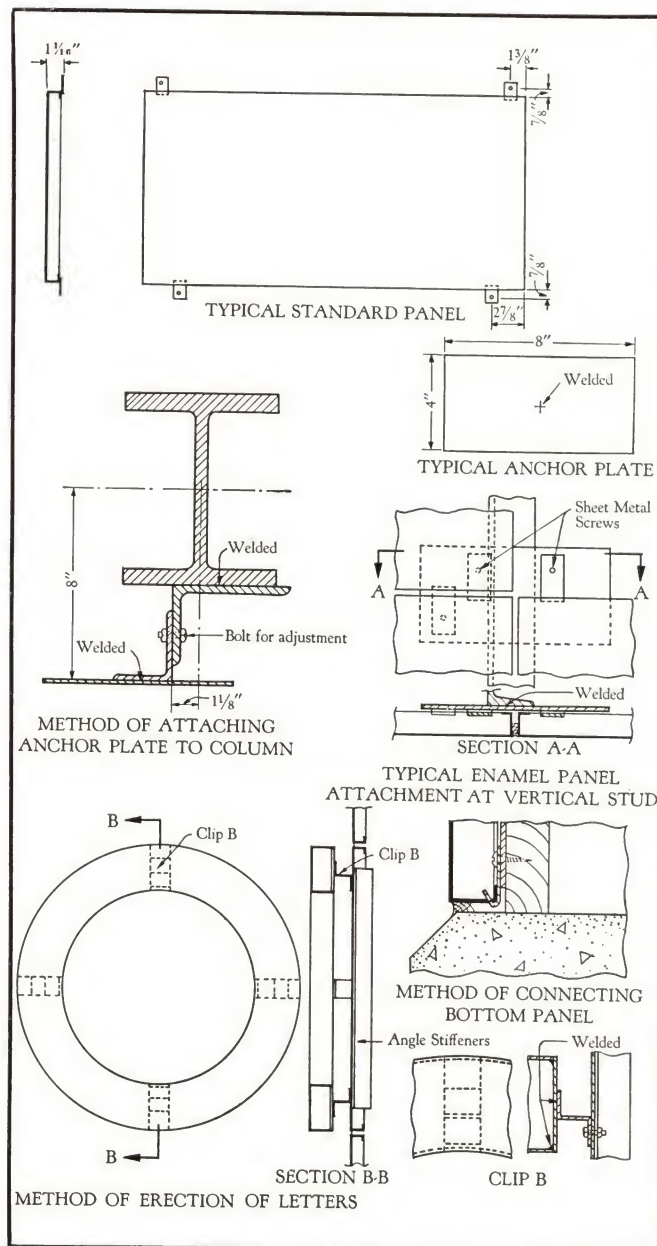
"(1) It permits a flexible construction which is little affected by sub-surface conditions because the exterior surface and the steel frame are integral parts. The porcelain enamel panels are attached to steel plates welded to the steel frame. In this way we obtain a truss action and the steel will bend rather than collapse.

"(2) The finish is permanently attractive and rain keeps the surface clean. At Girardville a color combination of white and blue was selected, but the use of this material imposes no restrictions as to color combinations.

"(3) Weight is another factor that must be considered. The low weight per unit of exterior surface makes it safely possible to use less structural steel and less foundation. The resulting thinner walls provide for more interior floor space.

"(4) The surface of porcelain enamel, being impervious to moisture, prevents frost damage. Maintenance costs are reduced to a minimum because painting is unnecessary.

"(5) Installation costs compare favorably with other types of construction."



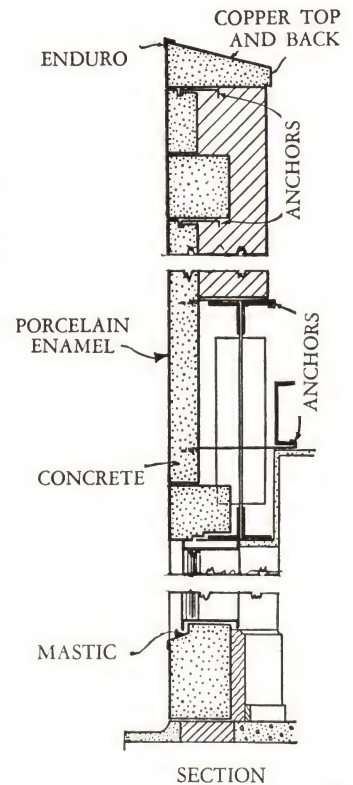
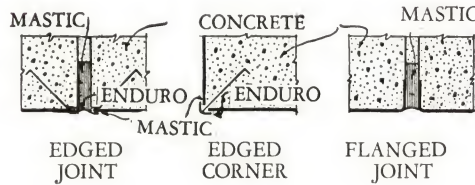
Macotta LOAD BEARING SYSTEM



Riviera Theater, Port Huron, Michigan

Fabricated by Maul Macotta Corp., Detroit, Mich.
Enameling by Wolverine Enameling Co., Detroit, Mich.

Macotta is a load bearing, fire-resisting structural unit applied to the masonry by mastic. It is built into, and becomes a part of the structure itself like stone or any similar material. The range of colors is unlimited and the enamel facings are supplied either with protective stainless steel edges or with enamel flanges. Erection is simple and rapid as Macotta is set on a mortar bed and joined in a manner similar to limestone or other masonry units. No special tools are required.



Snap-on Moulding SYSTEM

This system is used chiefly on interior work. Stainless Steel mouldings may be used as a part of the design. When run vertically they impart a feeling of height, and when run horizontally one of spaciousness. The mouldings are in two parts. The lower portion or track is fastened to the wall or furring strip by screws and overlaps the edges of the panels holding them securely. When in place the cover or finish moulding is snapped in place. In chemical, food and beverage plants and wherever sanitation is important the strips should run vertically so that water used in washing the walls will not settle in the joint. Where the walls are to be washed frequently, caulking compound is placed between the track or lower portion of the moulding and the panel. Where special flatness is important the sheets should be backed with insulation board with Republic Galvannealed Sheets on the reverse side.

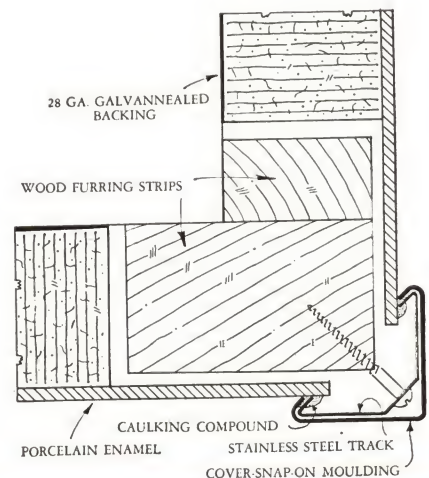
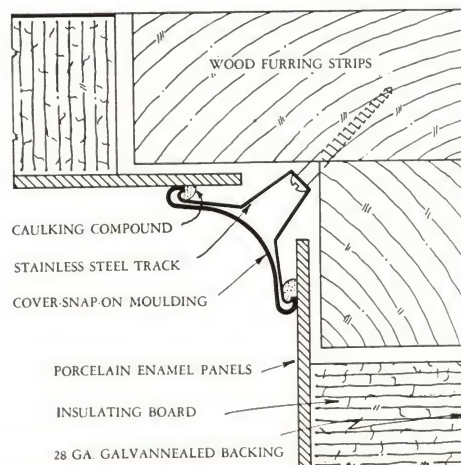
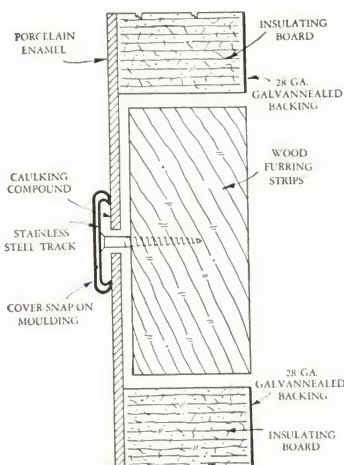
The sheets do not interlock and any panel may be removed without disturbing the others.



Laboratory of Chicago Vitreous Enamel Product Co.

Harold R. Zook, Architect.

The walls, ceiling, door, shelving and exhaust hood are all porcelain enameled. Panels are held in place by snap-on mouldings.



Metal Furring Strip AND Screw Clamp SYSTEM

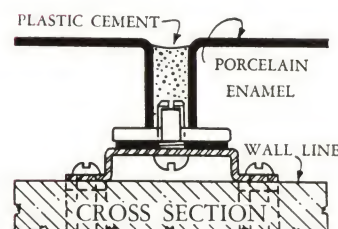
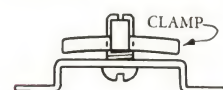
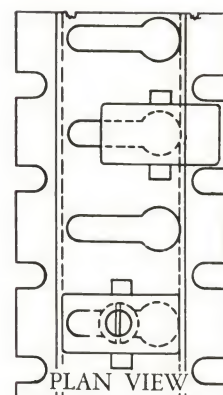
A special metal furring strip is used in this system in place of the wood strips used in many systems. These strips are secured to the wall by screws in the slots on the sides. Panels are fastened to the strips by means of special screw clamp, which extends through slots in the sides of the panels. Head of the screw is slipped into the keyhole slot in the furring strip and tightened by a slot for screw driver in the end of the screw. Clamps are single or double used at border panels or adjoining panels respectively. Joints are filled with mastic or may be covered with "snap-on" metal moulding which is held by a special stud. An extension bracket is used to line up irregularities in the under surface.



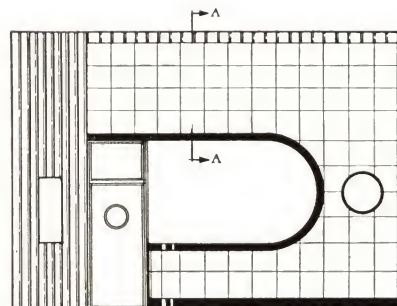
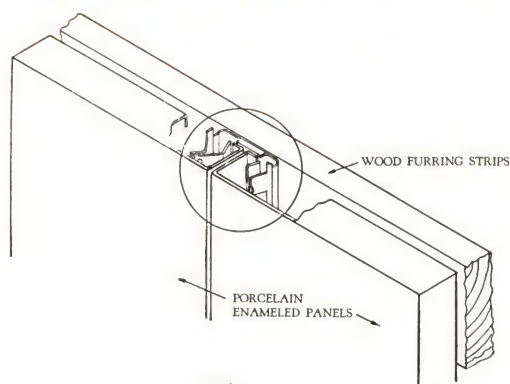
Clabby Block, Atlantic City, N. J.

Howard A. Scott, Atlantic City, N. J., Architect
Enameling by Enamel Products Co., Cleveland, Ohio

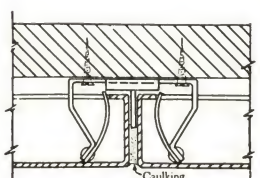
Main portion of the building is in ivory, base is black. Two shades of green used in the chevron trim at the top. Porcelain enamel applied by the metal furring strip and screw clamp system.



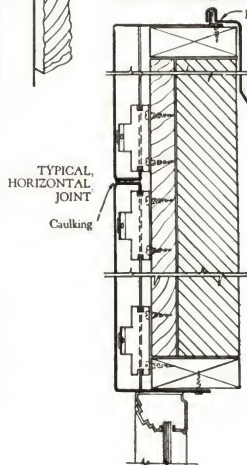
Spring Clip SYSTEM



ELEVATION



TOP VIEW OF TOLEDOKLIP AND PORCELAIN PANELS



SECTION "A-A"

This is a non-interlocking system and any panel may be removed without disturbing adjacent panels. Indentations in the flanges of the panels snap over special spring clips which have previously been fastened to the wall. The clips give a floating panel construction which allows for expansion and contraction and for absorbing vibration shocks. For exterior work the joints are filled with mastic. For interior work the joints are narrow and require no filler.

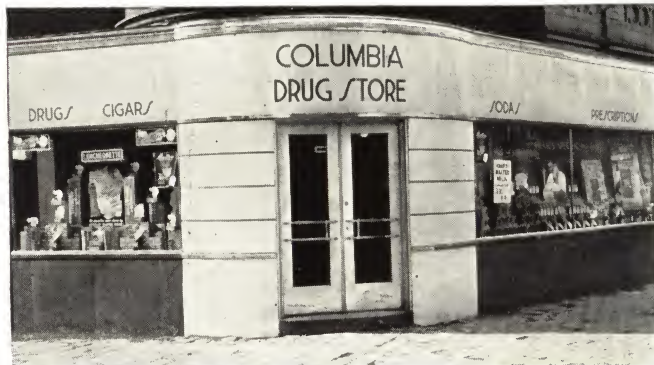


Lock Joint SYSTEM

This lock joint construction makes it possible to attach the panels directly to the old walls without the use of furring strips, adding only about $\frac{3}{8}$ in. to the old walls.

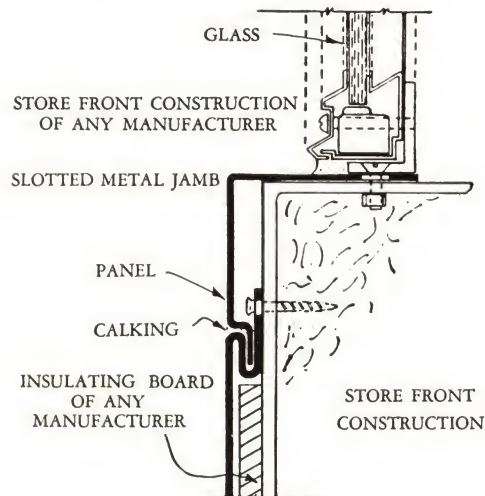
The edges of the panels are formed to dovetail together as shown. The lower panel is fastened to the

building by screws on wooden structures or expansion bolts on concrete. The next panel is then dovetailed into the first. The joint is filled with mastic which not only makes it watertight but also prevents any vibration. As the joints are narrow only a small amount of mastic is required in this system.



Columbia Drug Store, Washington, D. C.

The lock joint system here solved a difficult problem of modernization. The building was already 2" over the building line and the building commission refused to allow further encroachment on the sidewalk until it was explained that the porcelain enameled panels would add only $\frac{3}{8}$ " to the walls. Fabrication and enameling by Toledo Porcelain Enamel Products Co., Toledo, Ohio.



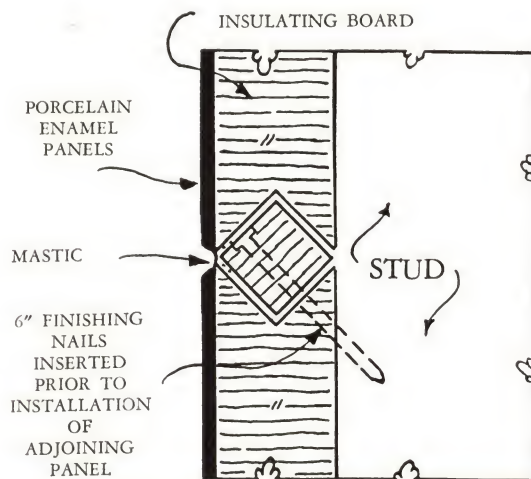
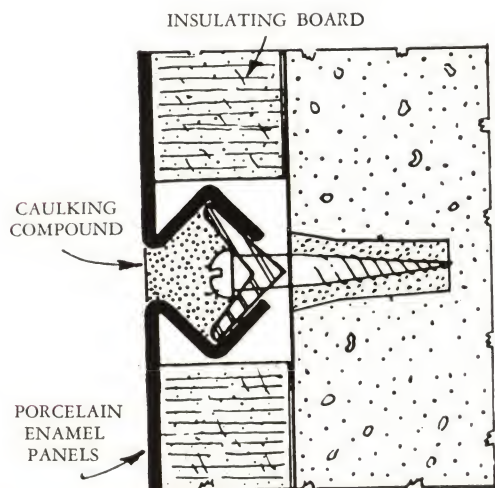
Vee Clamp SYSTEM

On concrete structures the edges of the panels are formed to fit under the sides of a special vee clamp which is secured to the structure by screws which are tightened into expansion plugs after the panels are in place. The joints are then filled with caulking compound. On wooden structures a square strip of wood is fitted into a recess in the edge of the insulating backing sheets. The strips are nailed to the structure before the adjoining panel is set in place after which the joint is filled with mastic.



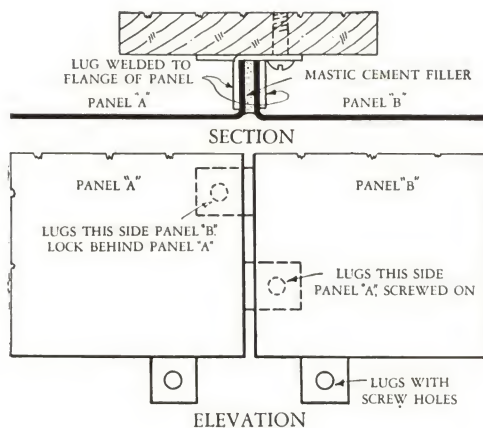
Office Building, Ferro-Enameling Company, Oakland, Calif.

Sheets applied by the Vee clamp system. An impression of depth was created by using two tones of one color to obtain the illusion of shadows in the wall panels above the windows.



Pan and Lug SYSTEM

Lugs are welded to each side of the panel before enameling. After one panel is fastened in place by screws through the lugs, those on the adjoining panel are interlocked under the edge of the first panel and the other sides held by screws. On exterior work the joint is filled with mastic. On interior work the joints may be made so narrow no filler is required. This simple system is used largely on remodeling work.



Pennzoil Gas Station, Erie, Pa.

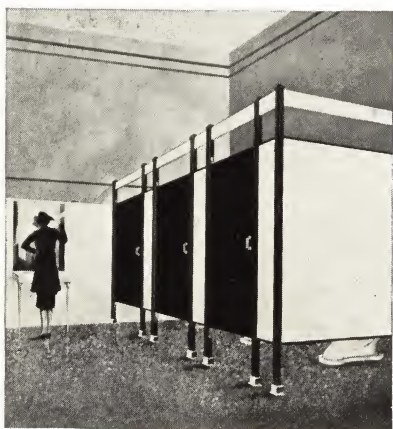
Porcelain enamel used on this smart service station designed and built by The Erie Enameling Co., Erie, Pa.



**Left: Firestone Super Service Station
Los Angeles, Calif.**

Enameling by U. S. Porcelain Enamel Co.,
Los Angeles, Calif.

A typical auto supply and service store utilizing the permanent beauty and attention value of porcelain enamel.



**Left: Toilet Partition
and Wainscote**

Manufactured by The Sany-
metal Products Co., Cleve-
land, Ohio

Enameling by The Enamel
Products Company, Cleve-
land, Ohio

A typical application of
porcelain enamel in schools,
institutions, etc.



Above: Standard Oil Service Station

Enameling by General Porcelain Enameling and Mfg. Co., Chicago, Ill.

Typical of buildings erected in many states. Entire building is covered with porcelain enamel, including cut-out letters and curved canopy. All porcelain panels furnished with Celotex backing applied at factory with acoustical adhesive compound. Panels applied with special spring clips.